

BASMENT

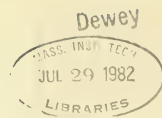






HD28  
.M414

No 1308



OFFICE : TECHNOLOGY AND PEOPLE

Peter G. W. Keen

April 1982

CISR WP # 87

Sloan WP # 1308-82

**Center for Information Systems Research**

Massachusetts Institute of Technology  
Sloan School of Management  
77 Massachusetts Avenue  
Cambridge, Massachusetts, 02139



OFFICE : TECHNOLOGY AND PEOPLE

Peter G. W. Keen

April 1982

CISR WP # 87

Sloan WP # 1308-82

© Peter G. W. Keen 1982

Center for Information Systems Research  
Sloan School of Management  
Massachusetts Institute of Technology

M.I.T. LIBRARY  
JUL 29 1961  
RECEIVED



OFFICE: TECHNOLOGY & PEOPLE

EDITOR'S PREFACE

Discussions of office technology are marked by a radical vocabulary. "The Third Industrial Revolution", "The Information Economy" and "The Office of the Future" are the rallying cries. Terms such as "productivity", "integration", "communication" and even "information" are used almost axiomatically, with little effort at definition.

Whether they take a positive or negative view of its likely impacts, the discussions share assumptions that office technology -- word processing, data storage and enquiry tools, communications networks, facsimile, teleconferencing, and so on -- will be a major, highly visible force in the coming decade.

- (1) It is seen by proponents as the solution to the productivity "problem" of secretarial, clerical and managerial work.
- (2) The decreasing cost, increasing variety, and ubiquity of the technical building blocks provide an impetus to their use in almost every organizational function. They will link the home with the workplace, the customer with the organization, and the individual with a computer-mediated\* society.
- (3) Information activities are viewed as dominating our economy, our society, and our future depending on how well we manage them.

\* This term should be credited to Shoshanah Zuboff.

## A LOOK BACK

There is often a deterministic flavor to both the utopian and anti-utopian visions that fall out of these assumptions. Utopian determinists, mainly in the technologists' camp, see the integrated "Office of the Future" as inevitable and beneficial. Who indeed could be against the Office of the Future or against productivity?

The anti-utopians wearily see this as yet another naive force-fitting of technology into organizations. They, too, accept its inevitability but see costs, not benefits -- a reduction in the quality of working life, increase in unemployment, and a loss of opportunity and autonomy for many workers.

If there is indeed an iron law of technology and if its impacts are largely deterministic, then there is no room for choice. Nor can research constructively contribute to a dialectical debate. A comment such as, "The concept of resistance to change is sociologically uninteresting," made at a conference on the social impacts of computers, is true from the determinist's viewpoint. To "corporatists", believers in the overall benefits of office technology but concerned with effective implementation, resistance is a key signal to be responded to, not trampled upon. To opponents, resistance is countervailing power. In both cases the assumption is that the strategies of management and the responses of workers do make a difference.

The office technology bandwagon is rolling fast, but it is still early enough for good research to push it off the track of technobabble and to stimulate an understanding of the key fact that the technology cannot be separated from the people.

Even the most enthusiastic proponents of office technology need to ask if we must relive the truly awful history of data processing. It took the data processing field almost thirty years to discover elementary facts about the nature of change and to realize that technology is not an independent, neutral artifact that can be casually dropped into an organization by outsiders. Current systems development wisdom stresses the need for user involvement. It is surely astonishing that the DP profession ever thought that noninvolvement was desirable! The systems development Fiasco Hall of Fame is packed with examples of costly mistakes, costly in terms of disruption and morale, not just money, caused by tenacious ignorance regarding users and their world (and, one must acknowledge, by users' and managers' acquiescence in that ignorance).

Data processing and management science, especially in the late 1960's, damaged more than helped many organizations. In the 1980's the picture is healthier, but anyone concerned with office technology, even peripherally, has to hope the learning curve this time will be shorter. The stakes are very high.

The impact of data processing was mainly confined to specific job functions and levels. In the mid-1970's, most people in the organization had no direct contact with computers. They were secondary users. One aim of office technology is to

broaden the base of primary users -- secretaries who use word processors to create text, managers who communicate via computer-based message systems, professionals who interact with enquiry systems and analytic models, and clerks who directly process transactions at work stations. Data processing initially affected a relatively homogeneous group of clerical workers. Office technology pushes the terminal further and deeper into the organization and into heterogeneous cultures.

#### DISTINCTIONS -- SOME OLD, SOME NEW

Office technology is less a technical innovation than a social one. The risks involved are not technical but social. The stakes in the game are people. To many observers it is the major cultural change which justifies the term "postindustrial revolution". Interestingly, many of its tools are not new. They draw on standard hardware and communications technology, and much of the software is relatively small in scale.

The term "office technology" is an easy and essential substitution for "office automation." A term too often associated with the loudest and least introspective boosters. While many thoughtful writers use it, it has unfortunately been debased -- the proceedings of most symposia on office automation are marked by simplistic generalities and cliches. The broader label "office technology" signals a different style of discussion -- one concerning not only automation of the office but the application of technology to office work as well.

Some key questions for research on office technology and its impact on people are:

1. What are the positive aspects of office technology? the negative? which will win?
2. What are the implementors and sellers of office technology overlooking? What research is needed here?
3. Where will applications have reached five years out? What will be the major changes to organizations and to individuals?
4. What are the key issues for research?
5. What conceptually and empirically do the fields of social science, management and even liberal arts offer to the study of office technology and people?

A group of researchers and practitioners in the field were asked recently to respond to those questions. Their responses, summarized below, form, in effect, a position paper on office technology. Covering a range of issues reflecting the breadth of background and interests of the writers, the responses none the less share common concerns and conclusions regarding the following issues.

- (1) **Definitions of Work.** The concept of the "office" is often vaguely defined by proponents of office technology who also pay too little attention to work processes and the culture of the office. At times this leads to inappropriate goals and ineffective implementation. It also limits the potential benefits and "social inventions"<sup>1</sup> office technology may facilitate. Almost without exception, the respondents see the need for a deeper understanding of the office and of work as the major theme for research.

"In the past two years, I have attended many seminars on office automation and have given one or two myself. Almost invariably speakers have opened with the question, 'What is office automation?' but more recently, the opening question has become even more basic, 'What is an office?'"<sup>2</sup>

". . . it is certain that the functions of what we now call offices will be dispersed across the social scape. 'Office' is already an inadequate label for where, when and how the information society is conducted. The inter-permeability, so to speak, of institutional, communication and spatial worlds affords us revolutionary opportunities."<sup>3</sup>

"If information technology is to be considered the technological infrastructure of the post-industrial society, its meaning must be located in terms of four key dimensions: the history of work, the nature of occupational life, the structure of collective behavior, and the psychological experience of productive activity."<sup>4</sup>

- (2) Measuring Productivity. If productivity is defined purely in terms of the ethos of efficiency, we can expect the technology to be used in ways which impair the quality of working life and limit variety and autonomy. Without a clear, operational measure of productivity, empirical research will be limited to anecdote and theory to assertion.

"If indeed productivity is the central issue, then organizational research should be directed at developing meaningful definitions, designing workable measurements and methodologies, and understanding how to make productivity measures and productivity incentives work in office environments."<sup>5</sup>

"To have true productivity gains through office automation may require a drastic rethinking of our conception of offices and how they function."<sup>6</sup>

- (3) Organizational Change. This is a constant theme. Office technology has immense implications for every aspect of organizational functioning. The expertise of social scientists and their understanding of the dynamics of change has had, in one respondent's phrase, "only modest influence on the introduction of new technology."<sup>7</sup> They must have a massive influence on the introduction of office technology.

"We now know reasonably well what to measure and what to do to produce changes in the attitudes and behaviors of both individuals and groups. The process isn't simple or short, but it can be accomplished, given adequate planning and skilled implementation. And there's the rub. In this area

the knowledge<sup>8</sup> is available, but the skills are in short supply.

- (4) The Design of Office Technology Equipment. This poses complex challenges. One respondent points out that even though principles of human factors research and cognitive science have contributed to significant improvements in office technology products, those products often reflect incomplete or inappropriate "social models of the user and the user's task . . . two common stereotypes that could affect design are that clerks don't make decisions and managers won't type." Tools define tasks. The new tools of OT significantly redefine work. Another comments that "as the essence of work changes, so does the psychological experience of performing it."<sup>10</sup>

One Norwegian researcher<sup>11</sup> indicates the extent to which the US has tended to ignore the experience of other countries: "At the recent National Computing Conference in Chicago some manufacturers boasted about their brand new ergonomic terminal, a terminal which did not even have a detachable keyboard. This machine would be illegal in Norway."

The goal of influencing the design of OT equipment through research on organizational issues is distinctive and new. Traditionally, social science research on computers has stressed issues of implementation and impact. It has thus not addressed the technologists' central concerns. This may partially explain why the research is often shrugged off and the compartmentalism of technological as opposed to behavioral issues is preserved.

- (5) Education. There is a general agreement that the pace of change fueled by office technology is accelerating, though many doubt that the process will be as smooth or the benefits as large as the utopians assume. Workers, managers, and technicians are not well-prepared to assimilate them, nor do they have an adequate base of knowledge. "The need is not for research but for teaching -- for transmittal of what we already know about how to manage individual and organizational change."<sup>12</sup>

"One of the big mistakes that was made when computers were introduced to support the data processing activities in organizations was a

failure to anticipate the skills that would be required in order to use this equipment."<sup>13</sup>

- (6) Communications. From the perspective of the technician the physical work station is often seen as the central component of office technology. Office technology began in earnest with word processing, and even now the office of the future is almost invariably discussed from the viewpoint of a single individual and a terminal. To those who look at office technology in organizational terms, it seems clear that the communications technology which links terminals is more important by far in terms of both impact and opportunity. The terminal redesigns individual work; communications technology redesigns the organization.

Indeed, an organization's communications network is implicitly a theory of the organization itself. As more and more of an organization's work is "mediated" by office technology, its structure, information flows, authority, influence, and formal and informational relationships will be defined by the network. Electronic message systems and teleconferencing change the nature of correspondence and meetings, but what is more important managerially is that the simple dichotomy between centralization and decentralization disappears as communications technology permits centraliation-with-decentralization.

"The computer is moving from being a product to being a component embedded in a whole range of end user devices. The systems of an organization will not be held together by the computing power of such devices but by their latent communication potential. We have got to break the dominance of the computer in thinking about information processing systems. An important key to effective progress in an organization is the communications infrastructure and the way this relates to communication facilities outside of the organization, rather, <sup>14</sup> than the sophistication of its computing equipment.

These six themes run through most of the editorial statements by the researchers and practitioners questioned. The program for research that falls out of them seems fairly clear. Research should be encouraged on:



- (1) the study of work
- (2) the impacts of technical change on the individual and the organization
- (3) the criteria for design of OT tools
- (4) a suitable conception and measure of productivity for OT
- (5) the knowledge base needed for effective education and
- (6) perhaps above all, a deeper, broader and more realistic picture of the relationship between people and technology and vice versa.

This is an activist program. It views a major purpose of research as providing an understanding that influences action. It should be stressed, however, that the key word is "understanding" not "claims" or "assertions" to influence action. The field of office automation already has too many of these. The audience for research on office technology issues should include managers, office technology practitioners, individuals affected by the technology, and researchers. "Good" research has the same overall characteristics from the viewpoint of all these groups. It is primarily methodological; it focuses, for example, on how to study work processes and what aspects to explore. Many practitioners will fully admit the necessity of paying more attention to behavioral and organizational issues. Where else could they look for sound empirical research and grounded theory?

There is ample evidence that strategies are lacking and that the very organizations most committed to office technology have as yet defined only the tactics of pilot projects and limited applications. One researcher,<sup>15</sup> a student at MIT, surveyed twenty-three major planning documents for office technology

produced by seven major organizations belonging to the Office Automation Roundtable (mid-1980). The OAR is a small forum established in 1977 to provide "a candid and informal exchange of information and ideas in both the managerial and technical aspects of the automated office of the future."

The objectives for the OAR included influencing management direction in establishing policies, planning methods and strategies. It is clear that even among these capable organizations the necessary concepts, vocabulary and measures for building a strategy are lacking. The findings serve as useful support for the argument that good research can indeed influence action in a direct way:

- (1) The seven organizations, private and public, see the problem office technology addresses as the "lack of productivity" of white-collar workers, yet only 5 of 23 studies offer a set of indices for measuring productivity. Few discuss a funding strategy, cost accounting procedures, or pricing methods. How, then, can they ever demonstrate or define productivity gains?
- (2) The focus is on secretarial and clerical efficiency. Office activities are described in terms of information flows or broad categories like "writing", "filing", or "telephone handling". The models of jobs, processes and structure are on the whole restricted and simplistic. As reported in the study, "With the exception of one case, all models appear to be modified (if not exact) versions of IBM's representations of business communication activities."<sup>16</sup>
- (3) While all the organizations mention the need for human resource development, only half the studies address training requirements of specifically define job design and responsibility requirements.
- (4) Policy issues -- technical and organizational -- are mainly ignored.
- (5) The communication's strategy is discussed in only 35% of the studies.

- (6) The major criteria for selecting alternatives are the management requirements for development, operation and training requirements. The impact of the technology on human behavior is not seen as a significant factor (mentioned in 22% of studies).
- (7) Only one company performed a post-implementation assessment of the impact of office technology on productivity.

A true strategy needs clearer concepts and measures. They may evolve through practice, but much of the necessary knowledge base is already available and largely unused because the links between research and practice, and the behavioral and the technical, are poorly forged.

#### A NEW TRADITION

There are two important additional themes that relate to the tone rather than the content of the responses by the researchers questioned -- values and the historical perspective. They represent a humanistic view of technology. All research must be honest, professional, probing and dispassionate, but this does not mean that it is value-free. It is value-expressive.

So long as computer technology was new and very complex and expertise hard to find, it was not surprising that social scientists sat on the sidelines. Parts of the technology do remain bewilderingly complex, but by now the mainstream of data processing, management science, and office technology is well understood by the historians, sociologists, psychologists, political scientists, anthropologists and economists who focus on the context and implications of computer applications.

Computers are both concrete and an abstraction. The concrete aspect is of course the boxes and the code. This is the visible part associated with engineering and computer science. The abstract component is the computer as a change agent, as a coupling device for organizational communication, as a tool to support thinking, as a mediator of work, and as an information resource. The computer as an organizational resource has been almost entirely discussed in terms of the concepts and vocabulary of engineering, which are appropriate only to the concrete part.

A humanistic tradition is emerging that provides a vocabulary to handle the abstraction, that in fact reveals the very large iceberg the terminal is sitting on. The technocentric tradition has largely led to a naive view of the user, simplistic concepts of work, overmechanized and inflexible models of organizational and social processes, and, above all, a definition of "productivity" in terms of the ethos of efficiency. The humanists no longer have a naive idea of technology. By creating the concepts and vocabulary most suitable for discussing the abstract component of computing, they can shift the policy debate.

An historical perspective has not been a characteristic of the computer field, which thrives on creating more and more that is "new." The "office of the future" as a phrase implies a break not only from the past but the present. As word processing replaces typewriters, we move to a new age. Why look back? For students in computer science, 1976 is the primeval past.

For many observers, however, what is most interesting about office technology is what is not new. They ask what happened last time and what remains the same when the technology changes? It is dispiriting to see how the lessons from data processing's early mistakes -- continued far too long -- are likely to be repeated in office technology, and how the same issues come up again and again to be overlooked by those for whom only the new is meaningful. We are promised productivity gains by advocates who do not reflect on the fact that these are the same promises made in the 1960's; the expected future did not occur and there are clear, immediate, valuable lessons to be learnt about productivity and implementation from looking back. To make any statement about the future impact of technology, we must surely check its past impact. The very label "post-industrial revolution" takes its definition from comparison with the earlier industrial revolution.

As a discipline, history is no longer a central part of most people's training. It is too easily thought of as narrative and archival, even antiquarian. In fact, the professional historian's training is less one of content than of perspective and process -- how to study complex phenomena and how to place collective issues into their wider temporal context. Its major topics are conflict and change and not events frozen in time. Office technology needs that perspective not only to know its own rate of change but to force consideration of the many non-technical issues involved in its successes or failures.

In confronting this metamorphosis of work, questions regarding its historical significance should be more sharply

developed. To what extent are there generic features of computer-mediated work that distinguish it from other forms of labor? What is the proper historical context for computer-mediated work? Does it represent a new economic epoch comparable to the first industrial revolution? Modern labor-management relations have their origin in the evolution of craft and industrial work. In the United States particularly they have been shaped by pressures exerted by scientific management and the bureaucraticization of industry. What are the continuities and discontinuities that the reorganization of work by information technology poses for these relationships?<sup>17</sup>

History frequently surprises and perhaps dismays. One way in which researchers will contribute to building an historical perspective is to reevaluate old "classics" in the literature, asking "What have we learnt since this was written and/or what ought we to have learnt?" As a new concept, office automation raises new questions such as, "How has office automation reversed the trend toward decentralization?" and new conclusions such as, "All the office employees I talked with, no matter what their position, realize that a revolution is taking place; most of them do not know how their own jobs will be affected but fear the worst."

These quotations all come from Ida Hoos's article "When the Computer Takes Over the Office",<sup>18</sup> published in 1960 in the Harvard Business Review. A major computer vendor demanded it be repudiated. The issues Hoos raises -- the very introduction of the phrase "office automation" -- lead one to shrug and make the comment that constantly can be applied to "new" technologies: le plus ca change. Must we indeed relive the awful history of data processing, ignoring what is already known?

Multidisciplinary research seems to take root only when it is directed toward an activist goal or a clear application area.

Office technology has both these characteristics. An historical perspective is perhaps the ultimate integrating force in a multidisciplinary field. Coupled with, for example, the economist's, political scientist's, sociologist's, or anthropologist's skills in theory and method, the historical viewpoint adds richness and scope of vision to any policy field. History discourages naive predictions, tends to be cautious about the impacts of change, sees conflict where casual observers want to see continuity, and constantly reminds us that cause and effect are complex.

Effort should be made to identify the reference disciplines whose addition to the office technology field will directly facilitate better research and practice. A reference discipline is one that provides criteria for defining what good research means. It seems obvious, for example, that anthropology is of central value since we have to learn how to study the office as a culture, as outsiders. Political science is another key since office technology, by redistributing data and altering communication flows, redefines influence and authority. The politics of data will be a major topic in business in the 1980s. It is already a well-scarred battleground. Many of the most insightful and exciting recent studies of management information systems take political science as the key reference discipline.

Finally, many of the researchers' and practioners' views stress the need to focus attention on possible problems. They also insist that research strategies not be conected but based on:

- (1) Sound principles, organizational and social as well as technical.
- (2) Explicit values, rather than on disguised ones or on positions that assume values are irrelevant --  
the greatest danger of office technology may be that it is not immorally applied but amorally. Its sin may be indifference to people.
- (3) Clear aims, realistic methods and sensible timetables;  
that it in fact be a strategy.

The issue is choice. A strategy is a conscious selection from available choices. This selection is obviously the responsibility of management in its widest sense. Most of the persons quoted in this paper view office technology as a mixture of great potential benefits and great potential hazards. There is an overall feeling that, as too often before, the benefits are being oversold and the question of cost evaded. Management's benefits may be the worker's costs. That said, they do not deny the benefits. They are calling for better strategies.

\*\*\*\*\*



References

15 Khalil, M.A. "A Strategic Planning Framework for Office Automation". Master's Thesis. Sloan School of Management. MIT. 1980.

Footnotes

- 1 Ellis, W. Russell
- 2 Markus, M. Lynn
- 3 Ellis, W. Russell
- 4 Zuboff, Shoshanah
- 5 Ware, James
- 6 Wynn, Eleanor H.
- 7 Walton, Richard
- 8 Ware, James
- 9 Wynn, Eleanor
- 10 Zuboff, Shosbanah
- 11 Bjorn-andersen, Niels
- 12 Ware, James
- 13 Firnberg, David
- 14 Firnberg, David
- 15 Khalil, Mohsen
- 16 Khalil, Mohsen
- 17 Zuboff, Shoshanah
- 18 Hoos, Ida

NOV 11 1982

NOV 11 1982

27 1985



1986

27 1986



~~BASEMENT~~

Date Due

MAY 23 1977

Lib-26-67

HD28.M414 no.1308- 82  
Keen, Peter G./Office : technology and  
744314 D\*PKS 00136522



3 9080 002 042 171

